The animals are responding to unconscious signals. Krall claims to have refuted this by "ignorant" experiments, but these are relatively few and seem all to have some weak spot. Thus Mackenzie reports that Rolf, the Mannheim dog, described a picture on a card held so that the holder could not see it; unfortunately, the picture was a red and blue cross, and there is reason to think that dogs are nearly colour-blind. Nevertheless, the fair number of "peep-hole" experiments and the case of the blind horse, Berto, seem to stamp as inadequate Pfungst's theory of *visually* perceived movements. Yet no other one mode of signal seems sufficient for all cases, while Hacker did actually get answers by moving his foot. Again, it is unlikely that the many individuals who have obtained answers should all make precisely the same unconscious movements. These difficulties disappear if we suppose the animals not to be blindly reacting to one specific stimulus, but to be interpreting more or less intelligently a general type of unconscious emotional or ideomotor expression—movement, variation of respiration, etc.—possibly always complex and varying with the individual and occasion. Both horses and dogs are notoriously sensitive to shades of emotional expression, and recent work by the Pawlow school indicates that dogs can hear sounds so faint as the beating of the heart. It is true, any theory of unconscious signalling presents difficulties. Units, tens, etc., are tapped with different feet; the spelling of verbal answers is phonetic, and *spontaneous* utterances are recorded, including a letter dictated by Rolf! Can the subconscious be credited with so much? The solution, if it ever comes, can scarcely fail to illuminate, if not the animal mind, at least that of man.

C. S.

THE REV. SIR JOHN TWISDEN.

AT his great age of nearly ninety, Sir John F. Twisden, whose death was announced last week, had survived most of his time, the generation of William Thomson and Todhunter, who could give a detailed account of his life and work, very valuable in its day.

The *Times* of December 8 describes the curious revival of the dormant baronetage, taken up by Sir John late in life, but his retirement from the Professorship of Mathematics at the Staff College must have taken place much earlier than 1885, as a consequence of the Cardwell scheme, which had decreed that mathematics was no longer of any use to a Staff Officer.

How Napoleon would smile if he could hear it! The sequel has proved that the economy was fatal to efficiency, when we consider the costly blunders of the Staff in South Africa; and here we are engaged in a war the greatest in the history of the world, and it is a Mathematical War.

After one old-fashioned battle in the open, both sides have dug in, and the war has become a vast siege, where all arms, horse, foot, and dragoons, are turned into garrison gunners, as I predicted in these columns nearly thirty years ago. This was the war for which we were not prepared.

Artillery science is our great requirement. Cavalry work is turned over to the motorist, to scour the country and round up the picturesque old-fashioned Uhlan. In South Africa we see how De Wet, the redoubtable cavalry leader, is run down ignominiously by motor-cars. It had not dawned on our military intelligence to compare by a slight mathematical calculation the available energy, in foot-pounds or ton-miles, of a gallon of petroleum against the equivalent weight of oats. But here was a specimen of the sort of education given by Twisden to the Staff College in his excellent "Practical Mechanics," a book too little known, but containing what Maxwell called the gentlemanly knowledge of the subject, which no Staff Officer should be without. The first chapter of it is a liberal education in elementary gumption, cleverly disguised in what appears a very simple question of no apparent difficulty, always, however, strong enough to unhorse the unwary.

This elementary instruction is being acquired by the junior ranks at the front at a vast expense, and the young officer can say, in the words of Hamlet, "I once did hold it, as our seniors do, a baseness to be scientific, and laboured much how to forget all learning; but now it did me yeoman's service."

G. GREENHILL.

NOTES.

THE Hunterian Oration of the Royal College of Surgeons of England will be delivered by the president —Sir Watson Cheyne—on February 15, but the customary dinner in the evening will not be held.

WE regret to see the announcement, in the Proceedings of the Chemical Society, that Dr. C. R. Crymble, of University College, London, who was a fellow of the society, was killed in action on November 20.

WE learn from the *Times* that Prof. A. Van Geuchten, who was professor of systematic anatomy and neuro-pathology at Louvain University, has died suddenly at Cambridge, where he was receiving hospitality as a refugee.

PROF. C. S. SHERRINGTON, Fullerian professor of physiology at the Royal Institution, will deliver a course of six lectures at the institution on muscle in the service of nerve, on Tuesdays in January and February next.

THE President of the Board of Agriculture and Fisheries has appointed Mr. E. J. Cheney, lately one of the assistant secretaries of the department, to the office of chief agricultural adviser to the Board, and Mr. F. L. C. Floud to be an assistant secretary of the department.

PROF. T. A. JAGGAR, director of the Hawaiian Volcano Observatory, and a group of his assistants, had a narrow escape of their lives during a recent ascent of Mauna Loa. The volcano had become active, discharging large quantities of lava. The scientific party, while making an ascent to study the eruption, was caught in a snowstorm and nearly overwhelmed by snowslides almost in the path of the lava streams.

La Nature has again made its appearance—the first time since the beginning of August, when publication was suspended on account of the war, most of its staff having joined the colours, while its printers, photographers, and engravers had ceased work. The date of No. 2149 of our interesting contemporary and namesake was August 1, and that of the next issue, No. 2150, is December 12. The articles in this issue deal almost entirely with subjects relating to the present war, among them being armoured trains, the spirit of science in the time of war, Cracow, the defence of Belgium by inundations, and dum-dum bullets. We trust that an unbroken and long existence is now in store for this weekly review of science and its applications to art and industry.

THE death is announced, at sixty years of age, of Mr. W. W. Rockhill, who did some valuable scientific exploration in China and Tibet under the auspices of the Smithsonian Institution about twenty-four years ago, and was the author of several important works upon this and other Oriental subjects. In 1884, when attached to the U.S. Legation in Peking, Mr. Rockhill began the study of the Tibetan and Chinese languages, with the view of undertaking exploration in Tibet. Four years later he started from Peking, and was across the frontier in March, 1889. Though he had to abandon his intention to visit Lhasa, he carried out successfully a long journey through much unknown country, and the narrative of his expedition is described in his "Land of the Lamas," published in 1891. His second great journey, described in his "Diary of a Journey through Mongolia and Tibet in 1891 and 1892," earned for him the gold medal of the Royal Geographical Society. During the eleven months which this journey lasted, Mr. Rockhill travelled 8000 miles, surveyed 3400 miles, and crossed 69 passes, all more than 14,500 ft. above sea-level. The volume in which he describes this journey takes a notable place among serious works on Central Asia. Mr. Rockhill was the leading American authority on Chinese matters, and he was on his way to Peking, where he was going to take a new appointment as adviser to President Yuan-Shi-kai, when he was taken ill. On December 4 he was removed from the steamer on which he was a passenger to the hospital at Honolulu, where he died from heart disease.

THE issue of the *British Medical Journal* for December 5 contains a statement of the schemes for research drawn up by the Medical Research Committee for the National Health Insurance Joint Committee, and since approved by the responsible Minister. The grants in aid of medical research arise from the annual revenue accruing from the penny in respect of each insured person (payable out of moneys provided by Parliament) to be applied for the purposes of research. The total amount available for 1914 is 56,000*l.*, of which 12,065*l.* has been spent on the purchase of Mount Vernon Hospital, and 7533*l.* on repairs, equipment, and salary. Administration is estimated to cost nearly 3000*l.*, and the research scheme, including a provision for additional grants for laboratory expenditure, more than 24,000*l.* This leaves an estimated balance of nearly 10,000*l.*, which, it is expected, will be reduced by the demands for special work needed in connection with the war. This special work is the extension of existing facilities for bacteriological investigation of infected wounds at the general military hospitals, including Territorial general hospitals, and the organisation for the adequate compilation of the medical and surgical statistics of the war. Among other subjects of medical research for which provision has been made are such matters as tuberculosis, rickets, and rheumatic infections. The research committee proposes, in order that researches carried out at different centres may be co-ordinated, to establish "special investigation committees" composed of one or more of the scientific members of the research committee, of members of the staff of the Central Institute, and of directors or workers in other research centres. The committee contemplates the publication of reports of work done upon special subjects with assistance from the research fund.

TWENTY-FIVE years have passed since the death of that eminent Russian traveller, N. M. Miklukho-Maklay. An account of his researches in geography and anthropology by Mr. N. A. Yanchuk has been translated in the December issue of *Man* by M. A. Czaplicka. He was a member of various scientific expeditions to the Canary and Madeira Islands, Morocco, New Guinea, Java, Malacca, and Australia. On his return to Russia in 1887 he commenced the preparation of a complete account of his travels, of which only one volume was completed before his death in the following year. Since then his papers have remained untouched. It may be hoped that on the conclusion of the war arrangements may be made for the publication of this valuable material. Meanwhile the bibliography of numerous papers contributed to scientific societies, which is appended to this article, will illustrate his marvellous activity and the wide range of his investigatons in geography and anthropology.

AN account of the trout or charrs of New England is given by Mr. W. C. Kendall, of the United States Bureau of Fisheries, in vol. viii., No. 1, of the Memoirs of the Boston Society of Natural History, and is rendered especially valuable by a series of seven very fine coloured plates illustrating the different species. Referring in his preface to these plates, which have been reproduced by Werner and Winter, of Frankfurt, the author says, "the paintings were made by the painstaking artist, Walter H. Rich, of Portland, Maine, of whose work the only possible criticism is it is too conscientiously true to life." The author has done his work with great thoroughness, both as regards the detailed scientific descriptions of the different species and varieties, and as regards the account of their habits and the conditions under which they are caught. The report should be equally useful to the naturalist and to the fisherman.

THE fishes obtained by the *Terra Nova* on Captain Scott's Antarctic Expedition are described by Mr. C.

Tate Regan in vol. i., No. 1, "Zoology," published by the British Museum (Natural History). Twelve of the species are regarded as new to science, four of them being new generic types. All but three of the twenty-five species collected by the expedition belong to the group Nototheniiformes, and the author gives a table (p. 26) showing in detail the distribution of this typical Antarctic group. Following the detailed descriptions of the fishes are two sections of a more general character, the first dealing with the distribution of Antarctic and Subantarctic fishes, and the second with the Antarctic continent during the Tertiary period. The author's conclusion is that neither the fresh-water fishes nor the marine fishes, whether Antarctic or South Temperate, support the theory that Antarctica has connected Australia with South America in Tertiary times, nor does he consider that the distribution of other groups of animals confirms such a view.

THE first part of a series of publications under the general title, "Beiträge zur Kenntnis der Land- und Süsswasser-fauna Deutsch-Südwestafrikas," which was published in the spring of the present year, contains some results of a scientific expedition to German South-West Africa, conducted by Dr. W. Michaelsen, of Hamburg, in 1911. At the same time Dr. Michaelsen publishes the first part of a series dealing with the marine fauna not only of the German colony but also of the whole West African coast, under the title, "Beiträge zur Kenntnis der Meeresfauna Westafrikas." A general account of Dr. Michaelsen's expedition, written by himself, is given in the former of the two works, which also contains reports on the Bryozoa by Kraeplin, the Copepoda by van Douwe, the Oligochæta by Michaelsen, the Isoptera by Sjöstedt, and the Skorpiones and Solifugæ by Kraepelin. In the volume on marine fauna the Hydrozoa and Pennatulacea are described by Broch and the Gephyrea by W. Fischer. Both publications are well illustrated with text figures and plates, and will add to the reputation as a scientific traveller which Dr. Michaelsen has already established by his reports of his earlier journeys to the Straits of Magellan and to Australia.

THE second part of vol. i. of the Journal of the Natural History Society of Siam contains a series of excellent papers and notes on the fauna of the country, and is well illustrated. It opens with the description of three new snakes, by Dr. G. A. Boulenger, and also contains the second part of a paper on the snakes of Bangkok, by Mr. Malcolm Smith, who, in a separate note, records for the first time the occurrence in Siam of that venomous species, the Indian crait (*Bungarus candidus*). The list of papers is completed by one on the birds of Bangkok, by Mr. W. J. F. Williamson, and a second, on those of the Raheng district, by Mr. C. S. Barton. In a note on the occurrence of an oily secretion in a wild ox during the "must" season, Mr. K. G. Gairdner, if we may judge from the figure he gives of its skull, appears to have mistaken a tsaine, or bautin (*Bos sondaicus porteri*), for a gaur (*B. gaurus*).

THE probable effects of the war on horse- and cattle-breeding in this country, and the measures that will have to be taken at its close to replenish our stock of horses, and at the same time to meet the great foreign demand for pedigree-cattle of all kinds which is likely to arise, loom large in the "Live Stock Journal Almanac" for 1915. Among others who write on this subject, Col. G. C. Ricardo is of opinion that in the future Government ought to buy remounts as two-year-olds, in order to help breeders. In another article Messrs. Stratton and Thomas discuss the future of cattle after the war, and point out the heavy drain that will almost certainly take place in our pedigree-stock when peace is proclaimed. Mr. Frank Webb writes to much the same effect, and suggests that in the not very distant future Russia will become a large buyer. The general opinion seems, indeed, to be that British and other pure bred stock will eventually oust the mongrel breeds from the civilised world; and, in consequence, that the prospect for breeders will ere long be of the brightest. In the matter of illustrations and in general get-up the present issue fully maintains the high reputation of this excellent almanac, which is certainly a wonderful shilling's-worth.

THE *Bulletin Trimestriel*, 1913, continues the summary of the plankton observations carried out by the International Council for the Exploration of the Sea during the years 1902–08. In this third part of the plankton *Résumé* ten groups are dealt with, the more lengthy articles concerning the Diatoms, the Radiolaria, and the second part of the Peridinidæ. In the 105 plates, most of which concern the Diatoms and Peridinidæ, the observed distribution of many important species is charted for the four quarterly cruises, distinctive symbols marking the different years of observation. In the text, so far as possible, a uniform method is preserved, the species of the several groups being discussed in relation to the seasonal horizontal and vertical range of occurrence in the different areas, the hydrographic relationships, and other points contributing to a fuller knowledge of the species and its part in the marine bionomics of North European waters. Much previous work has been incorporated, and when the magnitude of these international investigations is remembered, involving as they do the careful study of many thousands of hauls, made at some hundreds of stations more or less regularly visited during these years, and extending from the Barents Sea to the Bay of Biscay, the importance of this valuable work to marine science may be justly estimated.

THE annual report of the Royal Agricultural Society just issued is a record of a busy and successful year. The 1914 show at Shrewsbury was especially notable for the excellence of the exhibits, while the live-stock entries were, with one exception, the largest on record. Attention is directed to the cutting off of the supplies of kainit and other potash salts owing to the war. As no regular supply is to be obtained outside Germany, the farmer and the manufacturer of artificial manures are adversely affected. It is suggested that the practice of kelp burning may be revived, while Peruvian and other guanos may be used to supply the necessary potash to a limited extent. The Woburn

Experimental Station, besides carrying out the usual field trials on crops of various kinds, has tested the influence of magnesia in place of lime on a wheat crop. The value of crushed oats with separated milk as a food for young calves, both spring and autumn-born, is proved by the calf-rearing experiments begun in 1912 and still proceeding. In addition to much advisory work on the extermination of insect pests and animal parasites, the Zoological Department is conducting a research into the relation of pheasants to agriculture. The society's programme for 1915 is a full one, only a few features being omitted owing to the abnormal conditions now prevailing.

The use of fish as cattle food has a novel sound, but it appears to be a common practice in various parts of the world. In Shetland and Iceland dry salt fish is fed to cattle, sheep, and even to horses. So long ago as 1853 Sir John Lawes carried out experiments at Rothamsted on the feeding of pigs with dried Newfoundland codfish. He found that the fish-fed pigs were fat and well ripened, and there was a very good proportion of increase to food consumed. Some recent experiments at the Agricultural College, Coimbatore, made at the instance of Sir F. Nicholson, director of the Madras Fisheries Bureau, have brought to light some further interesting facts. Mr. R. Cecil Wood, in describing the experiments, mentions that certain special cattle kept for display of strength at village festivals in Nandyal are fed with mutton, while it seems a fairly common practice to make use of bandicoots when killed by pounding them in a mortar and feeding them to cattle. In Mr. Wood's experiment two lots of heifers were fed on a dried fish diet and normal diet respectively. The animals took some little time to get used to the fish, but then ate it readily enough. At the end of six months the fish-fed heifers showed an average increase of weight of 54 lb. per head, as against 70 lb. for the normally fed animals. Although fish does not compare favourably with ground-nut so far as fattening value is concerned, it is suggested that on the coast a considerable saving might be effected by its use.

The cultivation of rice in Spain affords an excellent example of the success attending a highly perfected system of agriculture. Most of the rice land is situated in the province of Valencia, where the cultivation was introduced at the time of the Moorish conquest. It is interesting to learn from Mr. E. J. Butler, in the *Agricultural Journal of India* for October, that many of the Oriental practices followed, and especially that of transplantation unknown elsewhere in Europe, are similar to those employed in India, and may probably be traced to the prolonged occupation of this district by an Eastern people. Although the total production of rice in Spain is the lowest of the six rice-growing countries, the yield per acre is double that obtained in Italy and Egypt, and more than six times the official figures for India. This result is due to the thorough cultivation of the fields with specially designed implements, to the system of transplantation, and the use of large quantities of suitable nitrogenous and phosphatic manures. The fear of encouraging malaria has hitherto acted as a deterrent to the extension of the area under rice in Europe, but at the recent International Rice Congress at Valencia the view was put forward that this prejudice is unfounded, provided that certain precautions are observed. If this view gains credence it can scarcely be doubted that there will be a material increase in the European production of this cereal.

The relations between the two mineral representatives of iron disulphide, pyrite and marcasite, are further explored by E. T. Allen, J. L. Crenshaw, and H. C. Merwin in a paper in the *American Journal of Science* for November (p. 393). The formation of marcasite from acid and of pyrite from alkaline solutions is shown by experiment and also by natural occurrences. Wurtzite and zinc-blende are proved to have similar relations, the former being, moreover, the unstable form.

In view of the rarity of fossil remains of apes and monkeys much interest attaches to the description by Dr. A. Smith Woodward, in vol. lxx (pp. 316–20, plate xliv.) of the Quart. Journ. Geol. Soc., of an form of the jaw at and near the point of insertion *fontani,* from the Upper Miocene of Seo de Urgel, Lérida, Spain. In several respects, notably in the form of the jaw and near the point of insertion of the digastric muscle and in the small size of the first molar, Dryopithecus approximates to the contemporary macaque-like genus Mesopithecus, and is therefore a primitive type.

Prof. A. C. Lawson, at the invitation of the Geological Survey of Canada, has revisited the pre-Cambrian area of Rainy Lake, where he first demonstrated in 1885 and 1887 the intrusive nature of much of the "Laurentian" gneiss. His results are now issued as Memoir 40 of the Canadian Survey, dated 1913. The names Coutchiching and Keewatin are retained for the two series penetrated by the Laurentian gneiss, the former being free from volcanic matter, and the latter, overlying it, being largely volcanic. The second intrusive gneiss, which is later than the Seine (Huronian) sedimentary series, is now styled Algoman by the author. The influence of Prof. Lawson's original papers has been far-reaching. As recent evidence, we may mention Mr. A. L. Hall's address on the Bushveld Complex (Proc. Geol. Soc. South Africa, 1914, p. xxii.), and Mr. P. A. Wagner's account of the gneisses of Southern Rhodesia (Trans., *ibid.*, vol. xvii., p. 39).

In the September issue of the Proceedings of the Philadelphia Academy, Mr. D. M. Barringer adduces further evidence in favour of the theory that the so-called meteor crater of Arizona, in place of being due to volcanic action, is really the result of the impact of a vast fall of meteorites. Of the occurrence at a remote epoch of such a fall there is ample evidence. One of the points on which the author lays special stress is the occurrence in the crater of large quantities of a quartz-glass, which was undoubtedly formed by the fusion of part of a bed of white sandstone occurring at a depth of about 350 ft. below the level of the plain, and not outcropping for a distance of seventy miles. This quartz-glass is stained with nickeliferous iron, which could only be of meteoric origin, and this fact, coupled with the lack of any evidence that crystalline quartz can be fused by the heat engendered during volcanic action, is regarded as conclusive testimony in favour of the impact theory. Corroborative evidence is afforded by the fact that intense heat is produced by the impact of big shells fired against armour-plating. The mass to which the origin of the crater is attributed was probably a dense cluster of iron-meteorites, which may possibly have formed the head of a small comet.

THE publications of the Norwegian Meteorological Institute for the year 1913 (Rainfall Observations and Year-book, both containing actual readings and mean values) are prepared in the usual careful way, and scarcely call for special remarks beyond those referred to in our previous issues. The year-book contains hourly and other observations at Green Harbour, Spitsbergen; the summary for 1912 shows that the yearly temperature was −10·4° C.; January, −24·4° (February −26·3°), July, 4·2; maximum, 9·9° on July 22; minimum −44·3° on March 31. The yearly rainfall (or melted snow) was 305 mm., on 124 days. The annual report shows that the success of ordinary weather forecasts, and notices for herring fisheries, was very satisfactory; storm warning telegrams are issued from Bergen. We note that Mr. A. S. Steen, formerly assistant-director, has succeeded Prof. H. Mohn in the directorship of the Meteorological Service, which position the latter held with much distinction from the establishment of the service in the year 1866.

SOME time before the loss of the *Titanic* Prof. Barnes, of Montreal, carried out a series of measurements of the temperature of the sea in the neighbourhood of icebergs, and came to the conclusion that the presence of an iceberg could be detected by a slight rise of temperature it produces in the sea-water around it In the summer of 1912 a party from the Bureau of Standards took automatic records of the temperature of the water during the patrol of the U.S.S. *Chester* and *Birmingham* in the North Atlantic, and their results are published in vol. x. of the Bulletin of the bureau. They show that the changes of temperature which occur in the sea far removed from icebergs are at least as great and sudden as those found in the vicinity of bergs, and that no positive conclusions as to the presence of bergs can be drawn from such changes. They find also that in the neighbourhood of a berg the temperature of the water is reduced more often than raised. These conclusions are almost identical with those arrived at during the cruise of the *Scotia*, sent out to the Newfoundland bank by the Board of Trade in the summer of 1913, except that on the *Scotia* small rises of temperature in the neighbourhood of bergs were more often recorded.

THE Bureau of Standards at Washington has issued a circular (No. 47) in which the tables of equivalents of United States customary and metric weights and measures are revised and brought up to date. It contains a useful series of conversion tables giving the equivalents of the metric and customary weights and measures from 1 to 999 units. From the introduction and definitions which precede the tables it would appear that for all practical and most scientific purposes the United States yard and pound are the same as those in the United Kingdom. The United States gallon (which is used for the measurement of liquid commodities only) is, however, only five-sixths of the imperial gallon, while the United States bushel (used only in the measurement of dry goods) is approximately thirty-two thirty-thirds of the imperial bushel. The bushel and gallon of the United States are not connected by the relation 8 to 1 as are those used in this country. The troy pound and the apothecaries pound are apparently still recognised in the United States as customary weights, although they have long died out in Great Britain. It may be of interest to note that the fundamental standard metre established in the United States by Act of Congress and by order of the Treasury is the international prototype metre, whereas the primary standard metre in the United Kingdom is the national prototype No. 16, which is shorter than the international metre by six-tenths of a micron.

AN important paper on the resins present in hops (*Humulus lupulus*, L.) has been published by Ö. Winge and J. P. H. Jensen in the *Comptes rendus* of the Carlsberg Laboratory (vol. ii., part 2, p. 116). It is shown that in the past a mistake has been made in considering one of the resins of hops, namely, the so-called γ-resin, as valueless; on the contrary, during the brewing process it both gives taste to the wort and helps in the precipitation of proteins. The total quantity of resins extracted from the hops by cold ether and determined by titration is an approximately accurate expression of the bitterness value of hops. Other data recorded show that the analytical methods hitherto used, which are based on the separation of the so-called soft resins from the hard resins, rest upon an insecure basis and give misleading results.

NO. 4 of the Proceedings of the Institute of Chemistry contains an account of the steps taken by the institute in conjunction with the Board of Trade, the Society of Chemical Industry, and other bodies, to consider the needs of this country as regards chemicals, dyestuffs, glass, and porcelain vessels, which have hitherto been manufactured in enemy countries. A committee, which was appointed on September 22, after taking evidence, has reported that there is every prospect of the chemical glass industry being taken up and worked satisfactorily in this country provided that the manufacturers can be afforded some guarantee of permanency for their enterprise, and that they may have some reasonable assurance that at the conclusion of the war the newly developed industry will not suffer from foreign competition, hitherto made possible by economic conditions which do not prevail in this country. Several firms have stated their intention to undertake the manufacture of chemical glass ware, whilst others are already experimenting with a view of supplying porcelain, crucibles, basins, and funnels. Later, at a meeting of the council of the institute, held on October 30, it was resolved to appoint an advisory committee to conduct research on glass, to be carried out in the laboratories of the institute with a view to arrive at suitable formulæ to be freely available to manufacturers. Another committee has been formed to consider the needs of this country as regards laboratory reagents and the standards of purity necessary for such substances.

Probably the most interesting structural steel work on the new Lötschberg-Simplon Railway is the steel arch bridge over the Bietsch Valley, of which an illustrated description appears in the *Engineer* for December 11. This bridge is remarkable for the fact that it is built on a short-radius curve of only 300 metres, and also on a gradient of 22·2 per 1000. The situation is over a craggy ravine, between two tunnels piercing the spur on either bank. The arch has a span of 95 metres between the centres of the hinges and a rise from this chord of 23·79 metres. Supported partly upon this arch and partly by the masonry approach arches are two trussed girder spans. These girder spans are attached to the back of the central arch by means of pivoted expansion brackets, and this part of the design is of peculiar interest in view of the complexity of the movements arising from change of temperature and vertical and lateral loading. The three structural elements in the bridge are all rectilinear, while the bridge floor and its bracing alone are curved and continuous between the pier abutments.

The thirty-first annual issue of the "Year-Book of the Scientific and Learned Societies of Great Britain and Ireland" has now been published by Messrs. Charles Griffin and Co., Ltd. This useful reference volume is a record of the work done in science, literature, and art during the session 1913–1914 by numerous societies and Government institutions, and has been compiled from official sources. On the whole it provides a comprehensive survey of the activities of associations with which it is concerned, but we have failed to find any reference to the Wireless Society of London, the Illuminating Engineering Society, and the Historical Association. It is a pity, too, that in a volume published at the end of 1914 the extended reference to the British Association should deal almost wholly with the 1913 meeting at Birmingham. The volume, the price of which is 7*s*. 6*d*. net, deserves a place in every reference library.

Messrs. J. Wheldon and Co., 38 Great Queen Street, W.C., have just issued a classified list of books and other works on mineralogy, metallurgy and mining, geology and palæontology, and related subjects. The catalogue includes recent purchases and selections from several libraries, and it should be seen by geological bibliophiles and librarians of scientific societies

Messrs. G. P. Putnams Sons ask us to say that the price of "The Essence of Astronomy," by Mr. E. W. Price, reviewed in Nature of November 12 (p. 280), is not 10*s*. 6*d*. net as there stated, but 3*s*. 6*d*. net.

OUR ASTRONOMICAL COLUMN.

Comet 1913*f* (Delavan).—The following ephemeris is taken from the Ephemeris-Circular of the *Astronomische Nachrichten* (No. 469, 1914), being communicated by J. Fischer-Petersen and Vinter Hansen of the Copenhagen Observatory:—

12h. M.T. Berlin.

	R.A. (true)	Dec. (true)	Mag.
	h. m. s.	° ′	
Dec. 17	16 20 40	−4 45·9	5·6
19	24 6	5 37·4	
21	27 29	6 27·7	5·7
23	30 47	7 17·0	
25	34 2	8 5·2	5·8
27	37 14	8 52·5	
29	40 22	9 38·9	5·9
31	16 43 27	−10 24·3	

Two photographs of this comet are reproduced in the current number of the Monthly Notices of the R.A.S. (vol. lxxv., November, 1914). They were taken on September 20 and 26 with the 3¼-in. portrait lens and 30-in. reflector of the Royal Observatory, Greenwich.

The Spanish Solar Eclipse Expedition.—The Madrid Observatory dispatched an expedition to Theodosia, in the Crimea, to observe the total eclipse of the sun on August 21. The party included MM. Ascarza, Carrasco, and Tinoco, with one or two voluntary helpers. The weather seems to have been favourable at their station, and the results obtained were satisfactory, and are briefly described in the *Comptes rendus* for November 30 (vol. clix., No. 22, p. 738). The corona is described as of a form analogous to that of minimum sunspots with polar rays a little more pronounced. Photographs of the spectra of the corona and chromosphere were successfully secured, and, in M. Carrasco's case, with special attention to the red, yellow, and green regions. While details regarding the wave-lengths will be published later, M. Carrasco directs attention to a red coronal radiation, the wave-length of which he gives as λ 6373·87 Å U. He describes the green coronal radiation as being very feeble or absent.

The Recent Transit of Mercury.—Accounts of the observations of the transit of Mercury in November last are published by numerous observers in several journals. In the Monthly Notices of the Royal Astronomical Society (vol. lxxv., No. 1, November) papers are communicated by the Royal Astronomers of Greenwich and Edinburgh, Mr. R. Jonckheere, Prof. Fowler, and Dr. J. L. E. Dreyer. The different phases seemed to have been well observed at Greenwich, and the Astronomer Royal states that "none of the observers saw the 'black drop,' a halo round Mercury or a bright spot on the planet. The phenomenon appeared just as might have been expected from geometrical considerations." This communication is accompanied by a plate illustrating seven positions of the planet, taken with the photoheliograph just about the times near the beginning of the transit. M. Jonckheere discusses the 368 measures of the diameter of the planet as made at the Royal Observatory, Greenwich, by several observers during the transit. At the Royal Observatory, Edinburgh, no distinctive marking on the planet's disc could be detected nor any halo, and the second internal contact was noted as "quite clean," no ligament of any kind being visible.

Prof. Fowler's observations corroborate the above. An additional observation by him to determine by spectroscopic means whether there was any strengthening of the telluric lines near the limb of the planet led him to conclude that no effect of the kind was seen. Dr. Dreyer's observations at the Armagh Observatory show that while he observed no halo round the planet, he noted the black drop at egress and a bright point or dot on Mercury's disc. In the *Comptes rendus* for November 23 (vol. clix., No. 21) MM. Gonnessiat and Chrétien present two notes on the transit.